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United States Telephone Association

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January 31, 1995

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JAN 31 1995
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street NW - Room 222
Washington, D.C. 20554

RE: Ex Parte Filing
CC Docket No. 94-1

DOCKET FILE COPY ORIGINAL

Dear Mr. Caton:

Attached is the United States Telephone Association's (USTA) response to a letter from Richard Metzger, Deputy Bureau Chief, Operations, Common Carrier Bureau dated January 20, 1995 to Frank McKennedy, Director - Policy Analysis for USTA. Mr. Metzger sought certain sensitivity analyses of the Christensen Associates TFP study filed by USTA in this proceeding. USTA has reservations concerning the economic and empirical value of some of the items requested. However, USTA commissioned Christensen Associates to develop the attached response.

Included in the USTA response are a cover page providing an explanation of the attached analyses, two pages for each analysis submitted including the addition of a combined analysis of items 1(a) and 1(b) of Mr. Metzger's letter. Further, USTA commissioned Christensen Associates to provide alternative runs of Items 2(a) and 2(b) which are also included.

With regard to Item 1(b) of the Metzger letter, USTA has determined that a large share of the information necessary to perform this analysis is not readily available. Further, if the base information is obtainable at all, it will require some time to develop usable data to perform the analysis. As a result, USTA proposed to the Tariff Division Staff a workable alternative until the availability of the needed information is determined.

Generally, Item 1(b) requires the development of industry composite interstate depreciation rates for each year used in the TFP study. USTA is currently investigating the availability of this data for the large number of LEC study areas involved and the time it would take to compile industry composite depreciation

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rates. USTA will advise Mr. Metzger and the Tariff Division staff when this has been determined. In the interim, USTA directed Christensen Associates to use the 1993 composite industry depreciation rates with appropriate study adjustments as described in the narrative.

A copy of this ex parte filing, the attachment and two machine readable disks are being filed in the Office of the Secretary on January 31, 1995. The same is being provided to ITS. Please include this notice and attached material in the public record of these proceedings.

Respectfully Submitted

Mary McDermott

Mary McDermott
Vice President and General Counsel

cc: Mark Uretsky
Dr. Anthony Bush
Alexander Belinfante

[redacted]

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January 31, 1995

The attached tables and enclosed diskettes represent Christensen Associates' response to the January 20, 1995 data request by Richard Metzger of FCC. Each of the attached tables responds to the various changes in parameter values for cost of capital, depreciation, and economic stock adjustment factor outlined in questions 1(a), 1(b), 2(a), 2(b) and 4. The tables also provide responses to questions 3, 5, 6, and 7 regarding 5-year rolling averages and average annual growth rates over various subperiods of the study (i.e., 1984-92, 1984-93, and 1985-93).

A separate Lotus worksheet has been created for each of the attached tables and the summary information contained on the paper copies is found in the range B:P1 to B:AB42 of each worksheet. The worksheet name corresponds to the question being responded to. For example, Q1A.WK3 is the response to question 1(a). Each worksheet contains four sheets. Sheet A contains the TFP calculations as performed on our PROD.WK3 worksheet from the workpapers for our 1993 study. Sheet B contains the summary information and computation of the rolling averages as exhibited on the attached tables. Sheets C and D contain the computation of the capital input and capital cost values using the alternative parameter values.

Note that scenarios involving 1(b), FCC depreciation rates, also involve changes to the economic stock adjustment factor. This is because the stock adjustment factor essentially embodies the depreciation of assets up to 1984. Consistency requires that if 1984-93 depreciation rates are changed, the pre-1984 depreciation rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b).

In addition to the scenarios requested in the January 20 Metzger letter, we have run some additional scenarios. First, scenarios 1(a) (FCC authorized rate of return) and 1(b) (FCC depreciation rates) have been run together. Alternatives have also been run for the economic stock adjustment factors in 2(a) and 2(b). Unlike 1(a) and 1(b), which represent fact-based alternative parameter values, 2(a) and 2(b) are simply numerical exercises with no economic or empirical basis. Therefore, we ran alternatives that provide a balanced range of alternative economic stock adjustment factors. Scenario 2(a)* (worksheet Q2A2.WK3) subtracts 0.1 from each of the adjustment factors to balance the addition of 0.1 found in 2(a). Scenario 2(b)* (worksheet Q2B2.WK3) sets each of the adjustment factors at 0.2 (the lowest value possible without obtaining negative capital stocks) to balance the setting of each factor at 1.0 in 2(a).

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	1993 STUDY VALUES
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	Study Values

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	1.1%	0.5%	0.6%	0.1%	4.0%	−3.9%
1986	2.8%	1.0%	1.8%	1.3%	3.8%	−2.5%
1987	1.8%	0.1%	1.7%	1.7%	3.1%	−1.4%
1988	2.1%	0.6%	1.5%	−3.2%	4.4%	−7.6%
1989	2.0%	−0.3%	2.3%	−3.7%	4.1%	−7.8%
1990	4.6%	−0.3%	4.9%	11.9%	4.2%	7.7%
1991	1.2%	−1.1%	2.3%	1.3%	2.9%	−1.6%
1992	3.5%	1.9%	1.6%	4.4%	5.1%	−0.7%
*1993	2.6%			−3.5%		
*US numbers not available for 1993						
Avg 84–92	2.4%	0.3%	2.1%	1.7%	4.0%	−2.2%
Avg 84–93	2.4%			1.2%		
Avg 85–93	2.6%			1.3%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	2.0%	0.4%	1.6%	−0.7%	3.9%	−4.6%
1990	2.7%	0.2%	2.5%	1.6%	3.9%	−2.3%
1991	2.4%	−0.2%	2.6%	1.6%	3.7%	−2.1%
1992	2.7%	0.2%	2.5%	2.2%	4.1%	−2.0%
**1993	2.8%	0.2%	2.6%	2.1%	4.1%	−2.0%

**1993 US numbers are latest 5–year average

This scenario presents the results of the Christensen Associates 1993 update of the LEC TFP study. Parameter values for cost of capital, depreciation, and economic stock adjustment are set at their study values.

FOOTNOTE CONTINUED ON NEXT PAGE

FOOTNOTE TO STUDY VALUE SCENARIO – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 1(a)
COST OF CAPITAL	1(a): FCC ROR
DEPRECIATION	Study Values
STOCK ADJUSTMENT	Study Values

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	1.1%	0.5%	0.6%	3.9%	4.0%	−0.1%
1986	2.6%	1.0%	1.6%	7.4%	3.8%	3.6%
1987	1.7%	0.1%	1.6%	−1.1%	3.1%	−4.2%
1988	2.1%	0.6%	1.5%	−4.1%	4.4%	−8.5%
1989	2.0%	−0.3%	2.3%	−1.5%	4.1%	−5.6%
1990	4.5%	−0.3%	4.8%	11.2%	4.2%	7.0%
1991	1.1%	−1.1%	2.2%	0.8%	2.9%	−2.1%
1992	3.3%	1.9%	1.4%	5.8%	5.1%	0.7%
*1993	2.5%			−0.9%		
*US numbers not available for 1993						
Avg 84–92	2.3%	0.3%	2.0%	2.8%	4.0%	−1.2%
Avg 84–93	2.3%			2.4%		
Avg 85–93	2.5%			2.2%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	1.9%	0.4%	1.5%	0.9%	3.9%	−3.0%
1990	2.6%	0.2%	2.3%	2.4%	3.9%	−1.5%
1991	2.3%	−0.2%	2.5%	1.1%	3.7%	−2.7%
1992	2.6%	0.2%	2.4%	2.4%	4.1%	−1.7%
**1993	2.7%	0.2%	2.5%	3.1%	4.1%	−1.1%
**1993 US numbers are latest 5–year average						

This scenario changed the cost of capital for each year from Moody's yield on public utility bonds to the FCC authorized rate of return. Christensen Associates selected Moody's yield on public utility bonds because it is a widely and is easily verified. If the FCC authorized rate of return is used, average annual TFP growth for the LECs becomes lower over the 1984–1992 period. (FOOTNOTE TO SCENARIO 1(a) CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 1(a) – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 1(b)
COST OF CAPITAL	Study Values
DEPRECIATION	1(b): FCC 93
STOCK ADJUSTMENT	Study Values*

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	1.0%	0.5%	0.5%	0.5%	4.0%	−3.5%
1986	2.9%	1.0%	1.9%	2.0%	3.8%	−1.8%
1987	1.8%	0.1%	1.7%	1.6%	3.1%	−1.5%
1988	2.1%	0.6%	1.5%	−1.5%	4.4%	−5.9%
1989	2.0%	−0.3%	2.3%	−3.4%	4.1%	−7.5%
1990	4.7%	−0.3%	5.0%	9.8%	4.2%	5.6%
1991	1.2%	−1.1%	2.3%	2.2%	2.9%	−0.7%
1992	3.5%	1.9%	1.6%	3.8%	5.1%	−1.3%
*1993	2.7%			−3.4%		
*US numbers not available for 1993						
Avg 84–92	2.4%	0.3%	2.1%	1.9%	4.0%	−2.1%
Avg 84–93	2.4%			1.3%		
Avg 85–93	2.6%			1.4%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	2.0%	0.4%	1.6%	−0.2%	3.9%	−4.1%
1990	2.7%	0.2%	2.5%	1.7%	3.9%	−2.2%
1991	2.4%	−0.2%	2.6%	1.7%	3.7%	−2.0%
1992	2.7%	0.2%	2.5%	2.2%	4.1%	−2.0%
**1993	2.8%	0.2%	2.7%	1.8%	4.1%	−2.3%
**1993 US numbers are latest 5–year average						

The original request for this scenario was to change depreciation rates from the economic rates of replacement to FCC prescribed depreciation rates. This would require depreciation rates from the 1984–1993 period and the pre–1984 period. USTA was unable to provide Christensen Associates with the industry average FCC prescribed rates. Thus, the sensitivity analysis was performed by using the 1993 FCC depreciation rates for every year of the study. Note that changes to the 1984–1993 depreciation rates also involve changes to the economic stock adjustment factor because the stock adjustment factor embodies the depreciation of assets up to 1984. Consistency requires that if 1984–1993 depreciation rates change, the pre–1984 rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b).

FOOTNOTE TO SCENARIO 1(b) CONTINUED ON NEXT PAGE

FOOTNOTE TO SCENARIO 1(b) – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 1(a) PLUS 1(b)
COST OF CAPITAL	1(a): FCC ROR
DEPRECIATION	1(b): FCC 93
STOCK ADJUSTMENT	Study Values*

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	1.0%	0.5%	0.5%	3.9%	4.0%	−0.1%
1986	2.7%	1.0%	1.7%	7.5%	3.8%	3.7%
1987	1.7%	0.1%	1.6%	−1.0%	3.1%	−4.1%
1988	2.1%	0.6%	1.5%	−2.4%	4.4%	−6.8%
1989	2.0%	−0.3%	2.3%	−1.5%	4.1%	−5.6%
1990	4.5%	−0.3%	4.8%	9.2%	4.2%	5.0%
1991	1.1%	−1.1%	2.2%	1.7%	2.9%	−1.2%
1992	3.3%	1.9%	1.4%	5.0%	5.1%	−0.1%
*1993	2.5%			−1.1%		
*US numbers not available for 1993						
Avg 84–92	2.3%	0.3%	2.0%	2.8%	4.0%	−1.1%
Avg 84–93	2.3%			2.4%		
Avg 85–93	2.5%			2.2%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	1.9%	0.4%	1.5%	1.3%	3.9%	−2.6%
1990	2.6%	0.2%	2.4%	2.4%	3.9%	−1.6%
1991	2.3%	−0.2%	2.5%	1.2%	3.7%	−2.5%
1992	2.6%	0.2%	2.4%	2.4%	4.1%	−1.7%
**1993	2.7%	0.2%	2.5%	2.7%	4.1%	−1.5%

**1993 US numbers are latest 5–year average

This scenario combines scenario 1(a) on cost of capital and scenario 1(b) on depreciation.

Scenario 1(a)

This scenario changed the cost of capital for each year from Moody's yield on public utility bonds to the FCC authorized rate of return. Christensen Associates selected Moody's yield on public utility bonds because it is a widely and is easily verified. If the FCC authorized rate of return is used, average annual TFP growth for the LECs becomes lower over the 1984–1992 period. (FOOTNOTE TO SCENARIOS 1(a) AND 1(b) CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIOS 1(a) PLUS 1(b) – CONTINUED

Scenario 1(b)

The original request for this scenario was to change depreciation rates from the economic rates of replacement to FCC prescribed depreciation rates. This would require depreciation rates from the 1984–1993 period and the pre–1984 period. USTA was unable to provide Christensen Associates with the industry average FCC prescribed rates. Thus, the sensitivity analysis was performed by using the 1993 FCC depreciation rates for every year of the study. Note that changes to the 1984–1993 depreciation rates also involve changes to the economic stock adjustment factor because the stock adjustment factor embodies the depreciation of assets up to 1984. Consistency requires that if 1984–1993 depreciation rates change, the pre–1984 rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b)

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 2(a)
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	2(a): Add 0.1

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	1.7%	0.5%	1.2%	−0.2%	4.0%	−4.2%
1986	3.3%	1.0%	2.3%	1.0%	3.8%	−2.8%
1987	2.4%	0.1%	2.3%	1.8%	3.1%	−1.3%
1988	2.6%	0.6%	2.1%	−3.3%	4.4%	−7.7%
1989	2.4%	−0.3%	2.7%	−3.9%	4.1%	−8.0%
1990	4.9%	−0.3%	5.2%	12.4%	4.2%	8.2%
1991	1.5%	−1.1%	2.6%	1.2%	2.9%	−1.7%
1992	3.7%	1.9%	1.8%	4.6%	5.1%	−0.5%
*1993	2.8%			−3.8%		
*US numbers not available for 1993						
Avg 84–92	2.8%	0.3%	2.5%	1.7%	4.0%	−2.2%
Avg 84–93	2.8%			1.1%		
Avg 85–93	3.0%			1.3%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	2.5%	0.4%	2.1%	−0.9%	3.9%	−4.8%
1990	3.1%	0.2%	2.9%	1.6%	3.9%	−2.3%
1991	2.8%	−0.2%	3.0%	1.7%	3.7%	−2.1%
1992	3.0%	0.2%	2.9%	2.2%	4.1%	−1.9%
**1993	3.1%	0.2%	2.9%	2.1%	4.1%	−2.0%
**1993 US numbers are latest 5–year average						

This scenario arbitrarily increases the economic stock adjustment factors by 0.1.
Christensen Associates used an economic stock adjustment factor to adjust the gross stock for the age distribution of the assets, based on U.S. Bureau of Economic Analysis (BEA) reports. To assist the FCC in determining the sensitivity of this parameter, Christensen Associates also performed an analysis by reducing the economic stock adjustment factor by 0.1. However, arbitrarily changing the economic stock adjustment factor results in an incorrect TFP number.
(FOOTNOTE TO SCENARIO 2(a) CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 2(a) – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 2(a)*
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	2(a)*: Subtract 0.1

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	0.3%	0.5%	−0.2%	0.5%	4.0%	−3.5%
1986	2.2%	1.0%	1.2%	1.6%	3.8%	−2.2%
1987	1.2%	0.1%	1.1%	1.5%	3.1%	−1.6%
1988	1.5%	0.6%	0.9%	−3.2%	4.4%	−7.6%
1989	1.5%	−0.3%	1.8%	−3.5%	4.1%	−7.6%
1990	4.4%	−0.3%	4.7%	11.4%	4.2%	7.2%
1991	0.9%	−1.1%	2.0%	1.5%	2.9%	−1.4%
1992	3.3%	1.9%	1.4%	4.3%	5.1%	−0.8%
*1993	2.4%			−3.1%		
*US numbers not available for 1993						
Avg 84–92	1.9%	0.3%	1.6%	1.8%	4.0%	−2.2%
Avg 84–93	2.0%			1.2%		
Avg 85–93	2.2%			1.3%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	1.4%	0.4%	1.0%	−0.6%	3.9%	−4.5%
1990	2.2%	0.2%	1.9%	1.6%	3.9%	−2.3%
1991	1.9%	−0.2%	2.1%	1.5%	3.7%	−2.2%
1992	2.3%	0.2%	2.2%	2.1%	4.1%	−2.0%
**1993	2.5%	0.2%	2.3%	2.1%	4.1%	−2.0%

**1993 US numbers are latest 5–year average

Scenario 2(a) is a complement to scenario 2(a) and arbitrarily changes the economic stock* adjustment factors by decreasing them by 0.1. The original scenario 2(a) requested an increase of 0.1. Christensen Associates used an economic stock adjustment factor to adjust the gross stock for the age distribution of the assets, based on U.S. Bureau of Economic Analysis (BEA) reports. To assist the FCC in determining the sensitivity of this parameter, Christensen Associates has both increased and decreased the economic stock adjustment factor by 0.1. However, arbitrarily changing the economic stock adjustment factor results in an incorrect TFP number. (FOOTNONTE CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 2(a)* – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 2(b)
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	2(b): All=1.0

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	3.3%	0.5%	2.8%	−0.9%	4.0%	−4.9%
1986	4.6%	1.0%	3.6%	0.6%	3.8%	−3.2%
1987	3.7%	0.1%	3.6%	2.0%	3.1%	−1.1%
1988	3.9%	0.6%	3.3%	−2.6%	4.4%	−7.0%
1989	3.5%	−0.3%	3.8%	−4.4%	4.1%	−8.5%
1990	5.6%	−0.3%	5.9%	12.5%	4.2%	8.3%
1991	2.2%	−1.1%	3.3%	1.2%	2.9%	−1.7%
1992	4.2%	1.9%	2.3%	4.7%	5.1%	−0.4%
*1993	3.3%			−4.6%		
*US numbers not available for 1993						
Avg 84−92	3.9%	0.3%	3.6%	1.6%	4.0%	−2.3%
Avg 84−93	3.8%			0.9%		
Avg 85−93	3.9%			1.2%		

FIVE−YEAR ROLLING AVERAGES

5−year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	3.8%	0.4%	3.4%	−1.1%	3.9%	−4.9%
1990	4.3%	0.2%	4.0%	1.6%	3.9%	−2.3%
1991	3.8%	−0.2%	4.0%	1.7%	3.7%	−2.0%
1992	3.9%	0.2%	3.7%	2.3%	4.1%	−1.9%
**1993	3.8%	0.2%	3.6%	1.9%	4.1%	−2.3%
**1993 US numbers are latest 5−year average						

This scenario arbitrarily changes the economic stock adjustment factor to 1.0. Changing the economic stock adjustment factor assumes that there is no decline in the economic efficiency of an asset over its lifetime (the "light bulb" assumption). This is inconsistent with the capital computations made in our study. Using a value of 1.0 is an incorrect assumption, but Christensen Associates performed the analysis as requested by the FCC staff. Arbitrarily changing the economic stock adjustment factor results in an incorrect TFP number.
FOOTNOTE TO SCENARIO 2(b) CONTINUED ON NEXT PAGE

FOOTNOTE TO SCENARIO 2(b) – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 2(b)*
COST OF CAPITAL	Study Values
DEPRECIATION	Study Values
STOCK ADJUSTMENT	2(b)*: All=0.2

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	−5.2%	0.5%	−5.7%	0.2%	4.0%	−3.8%
1986	−2.0%	1.0%	−3.0%	1.7%	3.8%	−2.1%
1987	−2.5%	0.1%	−2.6%	−0.6%	3.1%	−3.7%
1988	−1.5%	0.6%	−2.1%	−2.7%	4.4%	−7.1%
1989	−0.8%	−0.3%	−0.5%	−3.2%	4.1%	−7.3%
1990	3.0%	−0.3%	3.3%	7.8%	4.2%	3.6%
1991	−0.6%	−1.1%	0.5%	2.0%	2.9%	−0.9%
1992	2.3%	1.9%	0.4%	3.0%	5.1%	−2.1%
*1993	1.3%			−1.6%		
*US numbers not available for 1993						
Avg 84−92	−0.9%	0.3%	−1.2%	1.0%	4.0%	−2.9%
Avg 84−93	−0.7%			0.7%		
Avg 85−93	−0.1%			0.8%		

FIVE−YEAR ROLLING AVERAGES

5−year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	−2.4%	0.4%	−2.8%	−0.9%	3.9%	−4.8%
1990	−0.8%	0.2%	−1.0%	0.6%	3.9%	−3.3%
1991	−0.5%	−0.2%	−0.3%	0.7%	3.7%	−3.1%
1992	0.5%	0.2%	0.3%	1.4%	4.1%	−2.8%
**1993	1.0%	0.2%	0.9%	1.6%	4.1%	−2.5%
**1993 US numbers are latest 5−year average						

This scenario is a complement to scenario 2(b) and arbitrarily changes the economic stock adjustment factors all to 0.2 (the lowest value possible without obtaining negative capital stocks. As requested by the FCC staff, Christensen Associates performed an analysis by changing the economic stock adjustment factor to 1.0 in scenario 2(b) and changed the factor to 0.2 in this scenario. Arbitrarily changing the economic stock adjustment factor is inconsistent with the 1984−1993 capital computations and results in an incorrect TFP number. (FOOTNOTE TO SCENARIO 2(b)* CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 2(b)* – CONTINUED

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling average of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focu of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 4(a)
COST OF CAPITAL	1(a): FCC ROR
DEPRECIATION	1(b): FCC 93
STOCK ADJUSTMENT	2(a): Add 0.1

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	1.8%	0.5%	1.3%	3.9%	4.0%	−0.1%
1986	3.3%	1.0%	2.3%	7.6%	3.8%	3.8%
1987	2.5%	0.1%	2.4%	−1.1%	3.1%	−4.2%
1988	2.8%	0.6%	2.2%	−3.6%	4.4%	−8.0%
1989	2.5%	−0.3%	2.8%	−1.3%	4.1%	−5.4%
1990	4.9%	−0.3%	5.2%	10.7%	4.2%	6.5%
1991	1.6%	−1.1%	2.7%	1.3%	2.9%	−1.6%
1992	3.7%	1.9%	1.8%	5.6%	5.1%	0.5%
*1993	3.0%			−1.2%		
*US numbers not available for 1993						
Avg 84–92	2.9%	0.3%	2.6%	2.9%	4.0%	−1.1%
Avg 84–93	2.9%			2.4%		
Avg 85–93	3.0%			2.3%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	2.6%	0.4%	2.2%	1.1%	3.9%	−2.8%
1990	3.2%	0.2%	3.0%	2.5%	3.9%	−1.4%
1991	2.8%	−0.2%	3.0%	1.2%	3.7%	−2.5%
1992	3.1%	0.2%	2.9%	2.5%	4.1%	−1.6%
**1993	3.1%	0.2%	3.0%	3.0%	4.1%	−1.1%

**1993 US numbers are latest 5–year average

This scenario combines scenarios 1(a), 1(b), and 2(a).

Scenario 1(a)

This scenario changed the cost of capital for each year from Moody's yield on public utility bonds to the FCC authorized rate of return. Christensen Associates selected Moody's yield on public utility bonds because it is a widely and is easily verified. If the FCC authorized rate of return is used, average annual TFP growth for the LECs becomes lower over the 1984–1992 period.

FOOTNOTE CONTINUED ON NEXT PAGE

FOOTNOTE TO SCENARIO 4(a) – CONTINUED

Scenario 1(b)

The original request for this scenario was to change depreciation rates from the economic rates of replacement to FCC prescribed depreciation rates. This would require depreciation rates from the 1984–1993 period and the pre–1984 period. USTA was unable to provide Christensen Associates with the industry average FCC prescribed rates. Thus, the sensitivity analysis was performed by using the 1993 FCC depreciation rates for every year of the study. Note that changes to the 1984–1993 depreciation rates also involve changes to the economic stock adjustment factor because the stock adjustment factor embodies the depreciation of assets up to 1984. Consistency requires that if 1984–1993 depreciation rates change, the pre–1984 rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b)

Scenario 2(a)

This scenario arbitrarily increases the economic stock adjustment factors by 0.1. Christensen Associates used an economic stock adjustment factor to adjust the gross stock for the age distribution of the assets, based on U.S. Bureau of Economic Analysis (BEA) reports. To assist the FCC in determining the sensitivity of this parameter, Christensen Associates also performed an analysis by decreasing the economic stock adjustment factor by 0.1. However, arbitrarily changing the economic stock adjustment factor by +0.1 or –0.1 results in an incorrect TFP number.

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 4(a)*
COST OF CAPITAL	1(a): FCC ROR
DEPRECIATION	1(b): FCC 93
STOCK ADJUSTMENT	2(a)*: Subtract 0.1

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	0.6%	0.5%	0.1%	3.9%	4.0%	−0.1%
1986	2.3%	1.0%	1.3%	7.2%	3.8%	3.4%
1987	1.3%	0.1%	1.2%	−0.9%	3.1%	−4.0%
1988	1.7%	0.6%	1.1%	−3.5%	4.4%	−7.9%
1989	1.6%	−0.3%	1.9%	−1.2%	4.1%	−5.3%
1990	4.3%	−0.3%	4.6%	10.1%	4.2%	5.9%
1991	1.0%	−1.1%	2.1%	1.5%	2.9%	−1.4%
1992	3.2%	1.9%	1.3%	5.2%	5.1%	0.1%
*1993	2.5%			−0.7%		
*US numbers not available for 1993						
Avg 84–92	2.0%	0.3%	1.7%	2.8%	4.0%	−1.2%
Avg 84–93	2.0%			2.4%		
Avg 85–93	2.2%			2.2%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	1.5%	0.4%	1.1%	1.1%	3.9%	−2.8%
1990	2.2%	0.2%	2.0%	2.3%	3.9%	−1.6%
1991	2.0%	−0.2%	2.2%	1.2%	3.7%	−2.6%
1992	2.3%	0.2%	2.2%	2.4%	4.1%	−1.7%
**1993	2.5%	0.2%	2.3%	3.0%	4.1%	−1.2%

**1993 US numbers are latest 5–year average

This scenario combines scenarios 1(a), 1(b), and 2(a)*.

Scenario 1(a)

This scenario changed the cost of capital for each year from Moody's yield on public utility bonds to the FCC authorized rate of return. Christensen Associates selected Moody's yield on public utility bonds because it is a widely and is easily verified. If the FCC authorized rate of return is used, average annual TFP growth for the LECs becomes lower over the 1984–1992 period.

FOOTNOTE CONTINUED ON NEXT PAGE

FOOTNOTE TO SCENARIO 4(a)* – CONTINUED

Scenario 1(b)

The original request for this scenario was to change depreciation rates from the economic rates of replacement to FCC prescribed depreciation rates. This would require depreciation rates from the 1984–1993 period and the pre–1984 period. USTA was unable to provide Christensen Associates with the industry average FCC prescribed rates. Thus, the sensitivity analysis was performed by using the 1993 FCC depreciation rates for every year of the study. Note that changes to the 1984–1993 depreciation rates also involve changes to the economic stock adjustment factor because the stock adjustment factor embodies the depreciation of assets up to 1984. Consistency requires that if 1984–1993 depreciation rates change, the pre–1984 rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b)

Scenario 2(a)*

This scenario arbitrarily decreases the economic stock adjustment factors by 0.1. Christensen Associates used an economic stock adjustment factor to adjust the gross stock for the age distribution of the assets, based on U.S. Bureau of Economic Analysis (BEA) reports. To assist the FCC in determining the sensitivity of this parameter, Christensen Associates also performed an analysis by increasing the economic stock adjustment factor by 0.1. However, arbitrarily changing the economic stock adjustment factor by +0.1 or –0.1 results in an incorrect TFP number.

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.

Christensen 1993 LEC TFP Update – Sensitivity Analysis

PARAMETER VALUES	QUESTION 4(b)
COST OF CAPITAL	1(a): FCC ROR
DEPRECIATION	1(b): FCC 93
STOCK ADJUSTMENT	2(b): All=1.0

	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1984						
1985	3.0%	0.5%	2.4%	3.8%	4.0%	−0.2%
1986	4.4%	1.0%	3.3%	8.0%	3.8%	4.2%
1987	3.6%	0.1%	3.5%	−1.3%	3.1%	−4.4%
1988	3.9%	0.6%	3.3%	−3.1%	4.4%	−7.5%
1989	3.5%	−0.3%	3.8%	−1.6%	4.1%	−5.7%
1990	5.4%	−0.3%	5.7%	10.7%	4.2%	6.5%
1991	2.2%	−1.1%	3.4%	1.3%	2.9%	−1.6%
1992	4.1%	1.9%	2.2%	5.7%	5.1%	0.6%
*1993	3.5%			−1.9%		
*US numbers not available for 1993						
Avg 84–92	3.8%	0.3%	3.5%	2.9%	4.0%	−1.0%
Avg 84–93	3.7%			2.4%		
Avg 85–93	3.8%			2.2%		

FIVE–YEAR ROLLING AVERAGES

5–year avg ending in	LEC TFP Growth	BLS US MFP Growth	TFP Growth Differential	LEC Input Price Growth	US Economy Input Price Growth	Input Price Growth Differential
1989	3.6%	0.4%	3.3%	1.1%	3.9%	−2.7%
1990	4.1%	0.2%	3.9%	2.5%	3.9%	−1.4%
1991	3.7%	−0.2%	3.9%	1.2%	3.7%	−2.6%
1992	3.8%	0.2%	3.7%	2.6%	4.1%	−1.5%
**1993	3.8%	0.2%	3.6%	2.8%	4.1%	−1.3%

**1993 US numbers are latest 5–year average

This scenario combines scenarios 1(a), 1(b), and 2(b)

Scenario 1(a)

This scenario changed the cost of capital for each year from Moody's yield on public utility bonds to the FCC authorized rate of return. Christensen Associates selected Moody's yield on public utility bonds because it is a widely and is easily verified. If the FCC authorized rate of return is used, average annual TFP growth for the LECs becomes lower over the 1984–1992 period. (FOOTNOTE CONTINUED ON NEXT PAGE)

FOOTNOTE TO SCENARIO 4(b) – CONTINUED

Scenario 1(b)

The original request for this scenario was to change depreciation rates from the economic rates of replacement to FCC prescribed depreciation rates. This would require depreciation rates from the 1984–1993 period and the pre–1984 period. USTA was unable to provide Christensen Associates with the industry average FCC prescribed rates. Thus, the sensitivity analysis was performed by using the 1993 FCC depreciation rates for every year of the study. Note that changes to the 1984–1993 depreciation rates also involve changes to the economic stock adjustment factor because the stock adjustment factor embodies the depreciation of assets up to 1984. Consistency requires that if 1984–1993 depreciation rates change, the pre–1984 rates must also be changed. Therefore, while we still retain the same approach to computing the stock adjustment factors, their values will change under 1(b)

Scenario 2(b)

This scenario arbitrarily changes the economic stock adjustment factor to 1.0. Changing the economic stock adjustment factor assumes that there is no decline in the economic efficiency of an asset over its lifetime (the "light bulb" assumption). This is inconsistent with the capital computations made in our study. Using a value of 1.0 is an incorrect assumption, but Christensen Associates performed the analysis as requested by the FCC staff. Arbitrarily changing the economic stock adjustment factor results in an incorrect TFP number.

5–year rolling averages for TFP are also calculated. The FCC also requested 5–year rolling averages of LEC total input prices and 5–year rolling averages of the rate of growth of U.S. private business sector input prices. The input prices for the LECs are a residual calculation and are not the main focus of the productivity study. The productivity study primarily focuses on quantities of output and input. USTA will file an affidavit by Dr. Laurits R. Christensen explaining why an input price adjustment is inappropriate in the LECs price cap formula.

This table also includes average annual growth rate calculations for the 1984–1992, 1984–1993, and 1985–1993 periods as requested by the FCC staff.